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1990



**APRIL 1990 MONTHLY
GROUND WATER SAMPLING RESULTS
LIVINGSTON RAIL YARD
LIVINGSTON, MONTANA**

Revised Version

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**APRIL 1990 MONTHLY
GROUND WATER SAMPLING RESULTS
LIVINGSTON RAIL YARD
LIVINGSTON, MONTANA**

Submitted to:

**Montana Department of Health
and Environmental Sciences
Cogswell Building
Helena, Montana 59620**

Submitted by:

**Envirocon, Inc.
101 International Way
P.O. Box 8243
Missoula, Montana 59807**

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1.0 INTRODUCTION

Between April 18 and 20, 1990, Burlington Northern Railroad (BNRR), through its contractor Envirocon, Inc. (Envirocon), took 19 samples from 13 monitoring wells on and around the Livingston rail yard and from the D Street and B Street Municipal Water Wells in the city of Livingston, Montana. One of the 19 samples was a trip blank and two were field duplicates.

All samples were analyzed at Energy Laboratories, Inc. (ELI) in Billings, Montana. Samples from Well L-87-7, the B Street Municipal Well, and the D Street Municipal Well were analyzed for volatile organic compounds (VOCs) by EPA Method 524.2. Samples from Wells 6, 7, 89-2, 89-3, 89-4, L-87-3, L-87-5, LS-8, LS-11, L-88-13, L-87-8, and LG-10 were analyzed for purgeable halocarbons (POXs) by EPA Method 601. The sample numbers, sample locations, analytical methods, sample methods, and sample dates are shown on Table 1.0. Well locations and summarized analytical results are shown on Figure 1.0. Complete laboratory results are enclosed in Appendix A.

TABLE 1.0
CORRELATION OF WELL AND SAMPLE NUMBERS
APRIL 1990

SAMPLE NUMBER	WELL NUMBER	ANALYTICAL METHOD*	SAMPLE METHOD	SAMPLE DATE
140101-341	# 6	601	DBP	4/19/90
140101-342	# 7	601	DBP	4/19/90
140101-343	89-2	601	DBP	4/19/90
140101-344	L-87-3	601	DBP	4/19/90
140101-345	L-87-5	601	DBP	4/19/90
140101-346	LS-8	601	DBP	4/19/90
140101-347	DUP OF LS-8	601	DBP	4/19/90
140101-348	LS-11	601	DBP	4/19/90
140101-349	L-88-13	601	DBP	4/19/90
140101-350	L-87-8	601	DBP	4/19/90
140101-351	L-87-7	524.2	DBP	4/19/90
140101-352	LG-10	601	NDBP	4/20/90
140101-353	LG-10	418.1	NDBP	4/20/90
140101-354	D STREET	524.2	TAP	4/20/90
140101-355	L-87-1	418.1 & 524.2	NDBP	4/20/90
140101-356	L-88-9	418.1	NDBP	4/20/90
140101-368	89-4	601	NDBP	4/25/90
140101-369	DUP of 29-4	601	NDBP	4/25/90
140101-370	EQ BLANK	601	NDBP	4/25/90
140101-371	89-3	601	NDBP	4/25/90
140101-372	B STREET	524.2	TAP	4/25/90
140101-373	TRIP BLANK	601	N/A	4/25/90

NOTES: * Refers to EPA analytical method
 DBP - Dedicated bladder pump
 NDBP - Non-dedicated bladder pump
 N/A - Not applicable

2.0 RESULTS AND INTERPRETATION

Sample results from most locations during the April 1990 monthly sample round are consistent with previous monthly and quarterly results. The only notable concentration changes occurred at Wells 7, L-87-8, 89-3, and LS-11. Results from these wells, the B and D Street Municipal Wells, and Well LG-10 are summarized below. A complete interpretation of monthly and seasonal variations in chlorinated ethene concentrations throughout the rail yard will be presented in the Ground Water Remedial Investigation Report.

Sample results from Well 7 show an increase in tetrachloroethene (PCE) concentrations from 8.6 parts per billion (ppb) during March 1990 to 23 ppb during April 1990. In addition, trichloroethene (TCE) was detected in Well 7 (0.94 ppb) for the first time since May 1989, and dichloroethene (DCE) was detected (1.9 ppb) for the first time since June 1989. These results are consistent with concentration trends noticed during 1989 at this well. The trends result from seasonal changes in ground water flow directions in the area near Well 7, as discussed in the November 1989 and February 1990 Quarterly Ground Water Sampling Results' reports.

Sample results from Well 89-3 show increased DCE and TCE concentrations from February 1990 results. In April, DCE was detected (1.6 ppb) for the first time since sampling at this well began in February 1990. Similarly, the TCE concentration increased from 0.56 ppb in February 1990 to 5.7 ppb in April.

Sample results from Well LS-11 continue to show monthly fluctuations in VOC concentrations. The chlorobenzene concentration at Well LS-11 decreased from 33 ppb in March 1990 to 9.3 ppb in April 1990, while the PCE

concentration decreased from 100 to 61 ppb. Monthly fluctuations of this degree in chlorinated ethene concentrations have been characteristic of Well LS-11 since Envirocon began sampling in May 1989. These fluctuations may be due to changes in ground water flow directions and the seasonal rise and fall of the water table beneath the API separator and overflow pond.

No detectable concentrations of purgeable organics were reported in the sample from Well LG-10 and no VOCs were reported in the sample from the D Street or B Street Municipal Wells. This is consistent with previous monthly and quarterly results.

The Montana Department of Health and Environmental Sciences (MDHES) split samples with Envirocon at Wells 6, 89-2, LS-8, L-88-13, and at the D Street Municipal Well. Results of these analyses are summarized on Figure 1.0. Complete laboratory results are included in Appendix A.

MDHES' results for Wells 6, LS-8, and L-88-13 correlate with Envirocon's results; however, results from Well 89-2 show significant differences. As shown on Figure 1.0, MDHES' results from Well 89-2 show detectable concentrations of PCE, TCE, and six other compounds. All reported compounds are very near their respective detection limits. Envirocon's sample was analyzed for POXs by EPA Method 601. This method does not analyze for six of the compounds reported by MDHES but does include PCE and TCE. ELI did not report any detectable Method 601 analytes in Envirocon's April 1990 sample from Well 89-2.

Samples taken by Envirocon at Well 89-2 during the February sample round were analyzed by EPA Method 524.2, and samples taken by Envirocon at Well 89-2 during the March sample round were analyzed by EPA Method 601. No detectable concentrations of any Method 524.2 or 601 analytes were

reported in these samples by ELI. EPA Method 524.2 includes the compounds reported by the MDHES in their April sample from Well 89-2. Envirocon will sample Well 89-2 again during the May 1990 sample round and will have it analyzed by EPA Method 524.2.

Envirocon and the MDHES took samples from the D Street Municipal Well on April 20, 1990. Both samples were mistakenly taken from a tap which discharges from city lines instead of from the D Street Well. ELI did not report any detectable Method 524.2 constituents in Envirocon's sample or in a laboratory duplicate; however, as shown in Appendix A, the MDHES laboratory reported detections of 0.552 ppb of 1,3,5-trimethylbenzene and .593 ppb of naphthalene.

3.0 QA/QC RESULTS

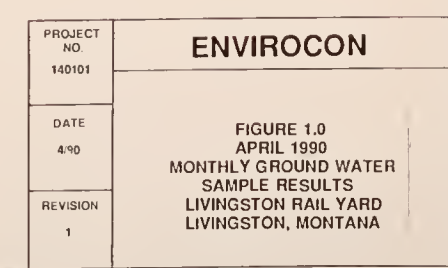
During the April 1990 sample round, Envirocon followed the Quality Assurance/Quality Control (QA/QC) Program outlined in the Interim Remedial Measures Work Plan (IRMWP) (Envirocon, April 1990). As shown in Appendix A, no detectable concentrations of any Method 601 analytes were found in the trip blank. As shown on Figure 1.0, results of the field duplicates taken from Wells LS-8 and 89-4 closely match results from the original samples.

One equipment decontamination blank was taken by the MDHES after sampling Well LG-10 and one decontamination blank was taken by Envirocon after sampling Well 89-4. As shown in Appendix A, chloroform and dichloromethane were the only constituents detected in the MDHES blank. These are common contaminants in the deionized water used during equipment decontamination.

Envirocons' decontamination blank taken after Well 89-4 contained 6.5 ppb PCE, in addition to 3.6 ppb chloroform. Chloroform is a common contaminant in the deionized water used during equipment decontamination. Monitor Well 89-3 was sampled immediately after the decontamination blank was taken. Because the analytical results from 89-3 show 280 ppb PCE, Envirocon is convinced that decontamination procedures had a negligible effect on the results at Well 89-3. Envirocon will continue to refine its decontamination procedures.

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* 600-21



APPENDIX A

LABORATORY RESULTS

ENVIROCON
PO BOX 8243
MISSOULA MT 59807

PROJECT: Livingston / BN

Water Analysis

LAB NO.	90-9957	90-9958	90-9959
SAMPLE IDENTIFICATION	140101-368	140101-369	140101-370
DATE REPORTED	05/24/90	05/24/90	05/24/90
SAMPLE SUBMITTED	04/26/90	04/26/90	04/26/90
SAMPLE DATE	04/25/90	04/25/90	04/25/90
SAMPLE TIME	1105	1105	1225
Purgeable Organics (EPA Method 601)	ug/l	ug/l	ug/l
Bromodichloromethane	<1.0	<1.0	<1.0
Bromoform	<1.0	<1.0	<1.0
Bromomethane	<1.0	<1.0	<1.0
Carbon tetrachloride	<0.50	<0.50	<0.50
Chlorobenzene	<1.0	<1.0	<1.0
Chloroethane	<1.0	<1.0	<1.0
2-Chloroethylvinyl ether	<1.0	<1.0	<1.0
2-Chlorotoluene	<1.0	<1.0	<1.0
Chloroform	<1.0	<1.0	3.6
Chloromethane	<1.0	<1.0	<1.0
Dibromochloromethane	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	<1.0	<1.0	<1.0
1,4-Dichlorobenzene	<0.50	<0.50	<0.50
1,1-Dichloroethane	<1.0	<1.0	<1.0
1,2-Dichloroethane	<0.50	<0.50	<0.50
1,1-Dichloroethene	<0.50	<0.50	<0.50
cis-1,2-Dichloroethene	6.6	6.6	<1.0
trans-1,2-Dichloroethene	<1.0	<1.0	<1.0
1,2-Dichloropropane	<1.0	<1.0	<1.0
cis-1,3-Dichloropropene	<1.0	<1.0	<1.0
trans-1,3-Dichloropropene	<1.0	<1.0	<1.0
Methylene chloride	<1.0	<1.0	<1.0
1,1,2,2-Tetrachloroethane	<1.0	<1.0	<1.0
Tetrachloroethene	480	490	6.5
1,1,1-Trichloroethane	<0.50	<0.50	<0.50
1,1,2-Trichloroethane	<1.0	<1.0	<1.0
Trichloroethene	4.0	3.9	<0.50
Trichlorofluoromethane	<1.0	<1.0	<1.0
Vinyl chloride	<0.50	<0.50	<0.50
Dichlorodifluoromethane	<1.0	<1.0	<1.0

ENVIROCON
PO BOX 8243
MISSOULA MT 59807

PROJECT: Livingston / BN

Water Analysis

LAB NO.	90-9960	90-9961
SAMPLE IDENTIFICATION	140101-371	140101-373
DATE REPORTED	05/24/90	05/24/90
SAMPLE SUBMITTED	04/26/90	04/26/90
SAMPLE DATE	04/25/90	04/25/90
SAMPLE TIME	1400	1607

Purgeable Organics (EPA Method 601)	ug/l	ug/l
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Bromodichloromethane	<1.0	<1.0
Bromoform	<1.0	<1.0
Bromomethane	<1.0	<1.0
Carbon tetrachloride	<0.50	<0.50
Chlorobenzene	<1.0	<1.0
Chloroethane	<1.0	<1.0
2-Chloroethylvinyl ether	<1.0	<1.0
2-Chlorotoluene	<1.0	<1.0
Chloroform	<1.0	<1.0
Chloromethane	<1.0	<1.0
Dibromochloromethane	<1.0	<1.0
1,2-Dichlorobenzene	<1.0	<1.0
1,3-Dichlorobenzene	<1.0	<1.0
1,4-Dichlorobenzene	<0.50	<0.50
1,1-Dichloroethane	<1.0	<1.0
1,2-Dichloroethane	<0.50	<0.50
1,1-Dichloroethene	<0.50	<0.50
cis-1,2-Dichloroethene	1.6	<1.0
trans-1,2-Dichloroethene	<1.0	<1.0
1,2-Dichloropropane	<1.0	<1.0
cis-1,3-Dichloropropene	<1.0	<1.0
trans-1,3-Dichloropropene	<1.0	<1.0
Methylene chloride	<1.0	<1.0
1,1,2,2-Tetrachloroethane	<1.0	<1.0
Tetrachloroethene	280	<0.50
1,1,1-Trichloroethane	<0.50	<0.50
1,1,2-Trichloroethane	<1.0	<1.0
Trichloroethene	5.7	<0.50
Trichlorofluoromethane	<1.0	<1.0
Vinyl chloride	<0.50	<0.50
Dichlorodifluoromethane	<1.0	<1.0



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PROJECT: Livingston/BN

Quality Assurance Spiked Analysis

CONSTITUENT	SPIKE AMOUNT		RANGE FOR P (%)
	ug/l	P (%)	
cis-1,2-Dichloroethene	5.0	118	60-140
Bromochloromethane	5.0	111	60-140
1,3-Dichloropropane	5.0	130	60-140
1,1,1,2-Tetrachloroethane	5.0	128	60-140
1,2,3-Trichloropropane	5.0	102	60-140
2-Chlorotoluene	5.0	94	60-140

P = percent recovery measured.

NOTE: Lab no. 90-9961 was spiked
with the above constituents
with these results.

ENVIROCON
PO BOX 8243
MISSOULA MT 59807

WATER ANALYSIS

PROJECT: Livingston / BN

PAGE 1

LAB NO.	90-9962
SAMPLE IDENTIFICATION	140101-372
SAMPLE SUBMITTED	04/26/90
DATE REPORTED	05/24/90
SAMPLE DATE	04/25/90
SAMPLE TIME	1538

VOLATILE ORGANIC CONSTITUENT	ug/l
Dichlorodifluoromethane	<1.0
Chloromethane	<1.0
Vinyl chloride	<0.50
Bromomethane	<1.0
Chloroethane	<1.0
Trichlorofluoromethane	<1.0
1,1-Dichloroethene	<0.50
Methylene Chloride	<1.0
trans-1,2-Dichloroethene	<1.0
1,1-Dichloroethane	<1.0
2,2-Dichloropropane	<1.0
cis-1,2-Dichloroethene	<1.0
Chloroform	<1.0
Bromochloromethane	<1.0
1,1,1-Trichloroethane	<0.50
Carbon Tetrachloride	<0.50
1,1-Dichloropropene	<1.0
Benzene	<0.50
1,2-Dichloroethane	<0.50
Trichloroethene	<0.50
1,2-Dichloropropane	<1.0
Bromodichloromethane	<1.0
Dibromomethane	<1.0
Toluene	<1.0
1,1,2-Trichloroethane	<1.0
Tetrachloroethene	<0.50
1,3-Dichloropropane	<1.0
Dibromochloromethane	<1.0
1,2-Dibromoethane	<1.0
Chlorobenzene	<1.0
1,1,1,2-Tetrachloroethane	<1.0

cc: Envirocon, Livingston.

COMPLETE ENVIRONMENTAL ANALYTICAL SERVICE

PAGE 2

LAB NO.	90-9962
SAMPLE IDENTIFICATION	140101-372
SAMPLE SUBMITTED	04/26/90
DATE REPORTED	05/24/90
SAMPLE DATE	04/25/90
SAMPLE TIME	1538

VOLATILE ORGANIC CONSTITUENT	ug/l
Ethylbenzene	<1.0
m-Xylene	<1.0
p-Xylene	<1.0
o-Xylene	<1.0
Styrene	<1.0
Bromoform	<1.0
Isopropylbenzene	<1.0
1,1,2,2-Tetrachloroethane	<1.0
Bromobenzene	<1.0
1,2,3-Trichloropropane	<1.0
n-Propylbenzene	<1.0
2-Chlorotoluene	<1.0
1,3,5-Trimethylbenzene	<1.0
4-Chlorotoluene	<1.0
tert-Butylbenzene	<1.0
1,2,4-Trimethylbenzene	<1.0
sec-Butylbenzene	<1.0
p-Isopropyltoluene	<1.0
1,3-Dichlorobenzene	<1.0
1,4-Dichlorobenzene	<0.50
n-Butylbenzene	<1.0
1,2-Dichlorobenzene	<1.0
1,2-Dibromo-3-Chloropropane	<1.0
1,2,4-Trichlorobenzene	<1.0
Hexachlorobutadiene	<1.0
Naphthalene	<1.0
1,2,3-Trichlorobenzene	<1.0
cis-1,3-Dichloropropene	<1.0
trans-1,3-Dichloropropene	<1.0

REMARKS: Sample was properly preserved and in specified container.
Sample was analyzed in accordance with EPA method 524.2.



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ENVIROCON
PO BOX 8243
MISSOULA MT 59807

WATER VOLATILE SURROGATE RECOVERY

PROJECT: Livingston / BN

SAMPLE NO.	S1 (TOL) #	S2 (BFB) #	S3 (DCE) #
90-9962	113	115	109

QC LIMITS

S1 (TOL) = Toluene-d8	(80-120)
S2 (BFB) = Bromofluorobenzene	(80-120)
S3 (DCE) = 1,2-Dichloroethane-d4	(80-120)

Column to be used to flag recovery values with an asterisk

*Values outside of contract required QC limits



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ENVIROCON
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WATER VOLATILE SURROGATE RECOVERY

PROJECT: Livingston / BN

SAMPLE NO.	S2 (BFB)#
90-9957	98
90-9958	99
90-9959	116
90-9960	104
90-9961	95

QC LIMITS

S2 (BFB) = Bromofluorobenzene

(80-120)

Column to be used to flag recovery values with an asterisk

*Values outside of contract required QC limits

